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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/056,179	01/22/2002	Theodore M. Taylor	MI22-1824	9467

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EXAMINER
WEISS, HOWARD

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 12/11/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/056,179	Applicant(s) TAYLOR, THEODORE M.
	Examiner Howard Weiss	Art Unit 2814

-- The MAILING DATE of this communication appears on th cov r sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 September 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *50-56,58,59 and 62-68* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *50-56,58,59 and 62-68* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *8* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

Attorney's Docket Number: MI22-1824

Filing Date: 1/22/02

Continuing Data: none

Claimed Foreign Priority Date: none

Applicant(s): Taylor

Examiner: Howard Weiss

Claim Objections

1. Claim 63 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. The Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 63 states that the floating gate only partially fills the region. However, Claim 65 states that the floating gate completely fills the region. Since a dependent claim (i.e. Claim 63) has all the limitations on the claims from which it depends (i.e. Claim 65), these limitations are in conflict with each other. Please see MPEP 608.01(n) II.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 50, 52, 53 to 56 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al. (U.S. Patent No. 6,376,877) and Shirai et al. (IEDM 1995).

Yu et al. show most aspects of the instant invention (e.g. Figure 7A) including:

- a semiconductive substrate **102**

- a pair of STI masses **316A**, **317A** with first portions within the substrate and second portions projecting outwardly from the substrate and having first W_F and second W_C cross-sectional dimensions where $W_C > W_F$
- a first dielectric layer **306A**
- a floating gate **308A** with a concave upper surface and which does not fill the region between the second portions of said STI masses
- a second dielectric layer **310A** and a control gate **312A**

Yu et al. does not show the rugged outermost surface of said floating gate being made of hemispherical grain polysilicon (HSG Poly-Si). Shirai et al. teach (e.g. see Abstract) to roughen up the outer surface of a floating gate using HSG Poly-Si to increase the capacitive-coupling ration of the memory cell. It would have been obvious to a person of ordinary skill in the art at the time of invention to roughen the outer surface of a floating gate using HSG Poly-Si as taught by Shirai et al. in the device of Yu et al. to increase the capacitive-coupling ration of the memory cell.

4. Claims 51, 52, 54, 58, 62, 65, 66 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ding et al. (U.S. Patent No. 6,214,667) and Shirai et al. (IEDM 1995).

Ding et al. show most aspects of the instant invention (e.g. Figure 2F) including:

- a semiconductive substrate **200**
- a pair of STI masses **214**, **216** with first portions within the substrate and second portions projecting outwardly from the substrate and having first and second cross-sectional dimensions which are essentially equal
- a first dielectric layer **204**
- a floating gate **222a** with a concave upper surface and which fills the region between the second portions of said STI masses
- a second dielectric layer **224** and a control gate **226**

Ding et al. do not show the rugged outermost surface of said floating gate being made of hemispherical grain polysilicon (HSG Poly-Si). Shirai et al. teach (e.g. see Abstract) to roughen up the outer surface of a floating gate using HSG Poly-Si to increase the capacitive-coupling ration of the memory cell. It would have been obvious to a person of ordinary skill in the art at the time of invention to roughen up the outer surface of a floating gate using HSG Poly-Si as taught by Shirai et al. in the device of Ding et al. to increase the capacitive-coupling ration of the memory cell.

5. Claims 50, 52 to 54, 58, 59, 63, 64 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh et al. (U.S. Patent No. 6,153,494) and Shirai et al. (IEDM 1995).

Hsieh et al. show most aspects of the instant invention (e.g. Figure 3e) including:

- a semiconductive substrate **100**
- a pair of STI masses **240**, **250** with first portions within the substrate and second portions projecting outwardly from the substrate and having first and second cross-sectional dimensions which are essentially equal
- a first dielectric layer **260**
- a floating gate **270** with a concave upper surface and which does not fill the region between the second portions of said STI masses
- a second dielectric layer **280** and a control gate **290**

Hsieh et al. do not show the rugged outermost surface of said floating gate being made of hemispherical grain polysilicon (HSG Poly-Si). Shirai et al. teach (e.g. see Abstract) to roughen up the outer surface of a floating gate using HSG Poly-Si to increase the capacitive-coupling ration of the memory cell. It would have been obvious to a person of ordinary skill in the art at the time of invention to roughen up the outer surface of a floating gate using HSG Poly-Si as taught by Shirai et al. in the device of Hsieh et al. to increase the capacitive-coupling ration of the memory cell.

The Examiner notes that Claim 63 is included in this art rejection because Hsieh et al. teaches the limitation of the floating gate partially filling the region. As noted above, the limitations in Claim 63 conflict with Claim 65 from which it depends.

Response to Arguments

6. The Applicant's arguments filed 9/19/02 have been fully considered but they are not persuasive. The Applicant states that the teachings of Shirai et al. cannot be combined with the other references since Shirai et al. uses LOCOS isolation not STI. However, the LOCOS isolations used in Shirai et al. are exemplary and the use of STI is not excluded as stated by the Applicant. For a reference to teach away form another reference, it must explicitly or otherwise specifically exclude the features and / or limitations described. Shirai et al. only mention LOCOS isolation in the one sentence as pointed out by the Applicant. No mention is made anywhere else in the Article concerning how the device is isolated.

In response to the Applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation to combine the teachings of Shirai et al. (i.e. to roughen up the outer surface of a floating gate using HSG Poly-Si) is found in the Abstract (i.e. to increase the capacitive-coupling ration of the memory cell).

In view of these reasons and those set forth in the present office action, the rejections of the stated claims stand.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Mori et al. (U.S. Patent Application Pub. No. 2002/0093073), Sakamoto et al. (U.S. Patent No. 6,459,121) and Yu et al. (U.S. Patent No. 6,448,606) teach similar devices as the instant invention.

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

   A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications. The official TC2800 Before-Final, **(703) 872-9318,** and After-Final, **(703) 872-9319**, Fax numbers will provide the fax sender with an auto-reply fax verifying receipt of their fax by the USPTO.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(703) 308-4840** and between the

hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 Receptionist at **(703) 308-0956**.

11. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/317, 510	thru 12/4/02
Other Documentation: none	
Electronic Database(s): EAST	thru 12/4/02

HW/hw
4 December 2002

Howard Weiss
Examiner
Art Unit 2814

SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800